

REMARKS/ARGUMENTS

As a preliminary matter, the current Action does not acknowledge applicants' claim for priority of GB 0314934.1 of June 26, 2003 or acknowledge receipt of the priority document which according to the Notice of Acceptance dated January 25, 2007 was received by the Office on December 23, 2005. Acknowledgement of receipt of the priority document in the next communication is requested.

Discussion of Claim Amendments

i) Applicant has cancelled claims 39 and 40 directed to a helmet.

ii) Applicant has voluntarily clarified claim 1 by amending the end of it to refer to a consolidation stage, as suggested in the Written Opinion issued in the International phase. Basis for the amendment may be found on original page 21 of the PCT specification, in the second and third full paragraphs.

iii) Applicant has also taken the opportunity to amend claim 1 with regard to the nature of the second layer. The pre-formed energy dispersive material has now been restricted to a pre-formed foam, basis for which may be found, *inter alia*, on page 10, second paragraph of the PCT specification. This means that the claim is now limited to a helmet in which the second layer is a foam that has been pre-shaped into its final shape.

iv) Applicant has amended claim 29 to read: "wherein the second layer comprising a pre-formed foam is formed from at least three interconnecting sections".

Substantive Arguments

Referring to the numbered sections of the Office Action:-

1-3. Applicant has amended claim 29 to meet the clarity rejection under 35 USC § 112. Claim 29 now reads:- "wherein the second layer comprising the pre-formed foam is formed from at least three interconnecting sections". Basis for this is found on page 12.

It is respectfully pointed out that the Examiner has misinterpreted previous claim 29 when suggesting that it should depend from claim 19. That is not correct. Claim 29 was intending to refer to "**the second** (pre-formed energy dispersive) **layer**" and not "**a second energy dispersive layer**".

It is respectfully submitted that the original claim 29 was referring to "the second layer", with the phrase "pre-formed energy dispersive" merely being descriptive. This is apparent from

the description at page 12 which is clearly discussing the pre-formed foam that forms the second layer, this following on from the page 10 and 11 discussions. Thus, page 12 explains (line 5) that “For non re-entrant shaped helmets the pre-formed foam can be located in the mould in one piece” and then proceeds to explain (at line 11) that for re-entrant shaped helmets (with a smaller mould mouth) “if the energy dispersive material is constructed from a plurality of pieces, then the energy dispersive layer can be inserted in to the mould”.

Thus, claim 29 has been correctly amended (in view of the claim 1 amendment) now to refer to the second layer comprising the pre-formed foam.

4-5. Claims 1-8, 39 and 40 are rejected under 35 USC § 103 (a) as being unpatentable over Brine et al (EP0650333) in view of Wilson (US 6,401,258). It is respectfully submitted that that rejection is unjustified. In particular, EP0650333 was acknowledged in the specification upon filing and merely considered to be representative of the prior art techniques, as specifically acknowledged by the European Patent Office in the International in the Written Opinion, which found the present claims patentable thereover. As recognized by the International Examiner in the Opinion, “although intermediate preformed energy dispersive layers are known in the available prior art, it is neither known nor suggested to assemble a helmet in such a manner. “

Discussion of the Invention

The present invention relates to a polymer composite sandwich (PCS) safety helmet. At the time of the invention, it was conventional to produce helmets by laying up a plurality of layers by manual assembly methods, as detailed in Brine et al., prior to resin infusion or curing. It was highly innovative for the present inventors to depart from standard sandwich core structures – involving the mere laying up by hand of respective material layers – to think to install a ready made, pre-shaped core layer, i.e. middle layer, when laying up the layers of the sandwich structure in the mould, and then to resin infuse and consolidate the respective layers so that the first, second and third layers form one integrated component.

The use in the invention of a second layer that is a pre-formed energy dispersive material reduces the complexity of assembling the layers in the mould, resulting in less reliance on skilled workers to conduct the assembly; it also reduces the number of further processing steps to complete the helmet, such as excessive shaping and cutting steps, since such shaping may be incorporated conveniently in the pre-formed material. At the time of the invention, the step of

incorporating any form of pre-shaped core into a mould that is forming a sandwich core structure was highly innovative. Importantly, the use of this second layer is applicable to both re-entrant and non re-entrant shaped helmets, and hence, may be adopted across the field of helmet manufacture. Also, the present polymer composite sandwich safety helmet can meet the safety standards and dimensional tolerances required for both professional users and normal users and can also be produced using mass manufacturing methods, to provide a low cost, lightweight safety helmet.

Claim 1 has now been amended to refer to the use of a pre-formed foam as the pre-formed energy dispersive material of the second layer. As discussed on pages 10 and 11 of the specification, this has many advantages. The foam is easy to use and handle during most manufacturing techniques and may readily be manufactured to the desired shape, density, thickness, by any suitable processing means; it can be easily be used for custom fittings where it is adapted to the wearer's head dimensions; it may be used as a single piece of foam, for example, for non re-entrant (i.e. open) shaped helmets (*see* page 12, first paragraph) or in say three inter-connecting pieces (*see* page 12, second paragraph) for a re-entrant shaped helmet, e.g. a motorcycle helmet, where the inside is less accessible.

Turning to Brine et al, this was fully acknowledged and discussed by the Applicant in the specification upon filing as follows:-

“However, there still remain a number of technical problems in producing sandwich core helmets using mass production techniques, especially if a high dimensional tolerance is also required. EP Patent 0650333 details the use of a sandwich type structure where an outer layer, which is comprised of either a resin and fabric or a pre-impregnated fabric, is placed in a female mould and pressed into place by hand. Afterwards the resilient layer and inner layer are loaded into the mould with hand pressing at each stage. The resilient material is defined as a flat sheet of either honeycomb, foam or cork. The problem with this method is that it requires each individual layer to be pressed by hand at each stage to ensure that it conforms correctly to the female mould, which is a time consuming process. A further problem arises when you press the flat sheet of foam under final consolidation pressure, as the foam will not conform properly to the mould shape and thus will decrease the dimensional tolerance of the finished helmet. Finally the consolidated helmet has to be finished, such as cutting out the opening for the visor.”

Thus, Brine et al is merely representative of the acknowledged practice at the time of laying up a sandwich core construction as a series of layers. It is submitted that the Examiner has failed to provide articulated reasoning with some rational underpinning to support the allegation of obviousness. It is unjustified merely to cite any prior art document that mentions pre-shaped parts and then to allege that these would have been adopted into sandwich core technology when the Applicant has explained that sandwich core technology in the preparation of helmets (always very three-dimensional objects) had previously relied on the manual lay-up of two-dimensional layers.

Hence, it is submitted that it is unjustified to attempt to combine Brine et al with any other document, when it clearly teaches towards the use of a sheet of cork, foam or honeycomb as a middle layer, and hence teaches away from the present invention, unless there is very convincing reasoning why that standard sandwich core construction assembly would have been departed from.

In particular, it is submitted that the citation of Wilson – which relates to a novelty helmet for sports fans e.g. “cheese hats” – is clearly unjustified and unrealistic. The complex safety/design issues associated with a motorcycle helmet and a novelty hat for soccer fans have no parallels and it is ridiculous to think that any manufacturer of safety helmets reading Brine et al would seriously consider or be influenced by the teaching of a document relating to novelty hats.

Accordingly, for all the fore going reasons, it is believed that the present invention clearly relates to inventive subject matter.

The remaining claims 2 to 8, are allowable by virtue of their appendance to allowable claim 1.

Claims 39 and 40 have now been cancelled.

6. Claims 18, 19, 25 and 43 are allowable by virtue of their appendance to allowable claim 1.

7. Applicant has explained with reference to sections 1-3 above how claim 29 is directed towards protecting an important and novel and inventive subsidiary technical aspect, namely, the use of at least three interconnecting sections to form the second layer. As explained

above, this allows the present invention, namely the idea of using a pre-formed i.e. pre-shaped foam sandwich core, to be applied to both non re-entrant and re-entrant shaped helmets.

As previously explained, at the time of the invention it was highly innovative to depart from standard sandwich core structures – involving the mere laying up by hand of respective material layers prior to resin infusion – to think to use a pre-shaped core layer (i.e. middle layer). In the same vein, the present invention goes further in this subsidiary aspect, by considering that a pre-shaped part could be made up of at least three **interconnecting** sections. Interlinking of 3D shaped sections within the middle layer prior to resin infusion is also highly innovative and hence, claims 29 to 31 each introduce additional features that are highly patentable in their own right.

Notwithstanding the above, claims 29 to 31 are in any case allowable by virtue of their appendance to allowable claim 1.

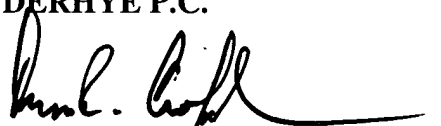
8. Claims 33 to 36 are allowable by virtue of their appendance to allowable claim 1.

For the above reasons it is respectfully submitted the claims of this application define patentable subject matter. Reconsideration and allowance are requested. Should the Examiner require further information please contact the undersigned.

Respectfully submitted,

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